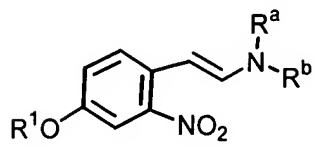
Amendments to the Claims

1. (Previously presented) A process for producing an indolopyrrolocarbazole derivative represented by the formula (I), which comprises the following steps:

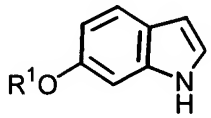
(i): the step of reacting a compound of the formula (XIII)



[XIII]

wherein R^1 represents a hydroxy protecting group, and R^a and R^b each independently represents a C_1-C_7 alkyl group, or R^a and R^b may be combined together to form a C_3-C_6 alkylenyl group, or a salt thereof with hydrogen gas in the presence of a rhodium compound and a metal compound to produce an indole compound of the formula (XII):

[XII]



wherein R^1 has the same meaning as defined above, or a salt thereof;

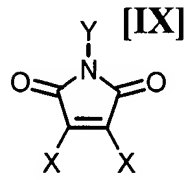
(ii): the step of reacting the resulting indole compound of the formula (XII) or a salt thereof with a magnesium chloride of the formula (XI):

R^cMgCl **[XI]**

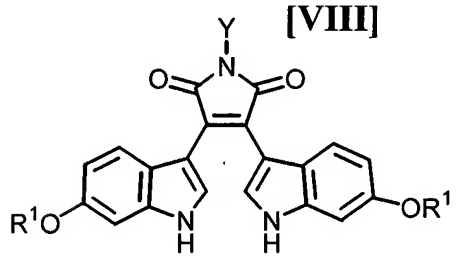
wherein R^c represents a C_1-C_7 alkyl group, a phenyl group, a vinyl group or an allyl group; or a magnesium compound of the formula (X):

R^dMgR^d **[X]**

wherein R^d represents a C_1-C_7 alkyl group or a phenyl group, or a salt thereof, or a mixture of the magnesium chloride (XI) and the magnesium compound (X), followed by reacting the resulting product with a maleimide compound of the formula (IX):

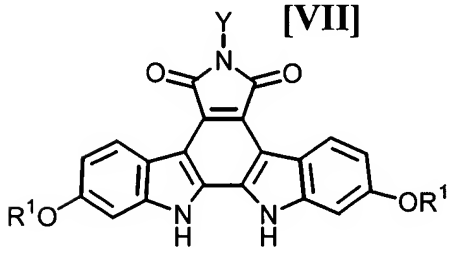


wherein X represents a halogen atom, and Y represents a hydrogen atom, a C_1-C_7 alkyl group, a phenyl group, a benzyloxymethyl group, or a C_7-C_{12} aralkyl group, to produce a bis-indole compound of the formula (VIII):



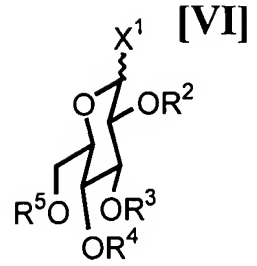
wherein R^1 and Y have each the same meaning as defined above, or a salt thereof;

(iii): the step of subjecting the resulting bis-indole compound (VIII) or a salt thereof to ring-closure reaction to produce a compound of the formula (VII):



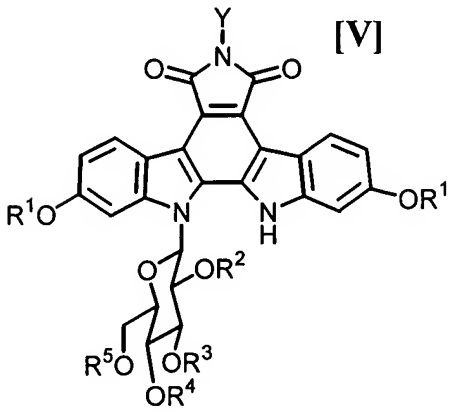
wherein R^1 and Y have each the same meaning as defined above, or a salt thereof;

(iv): the step of coupling the resulting compound (VII) or a salt thereof with an activated glucose derivative of the formula (VI):



[VI]

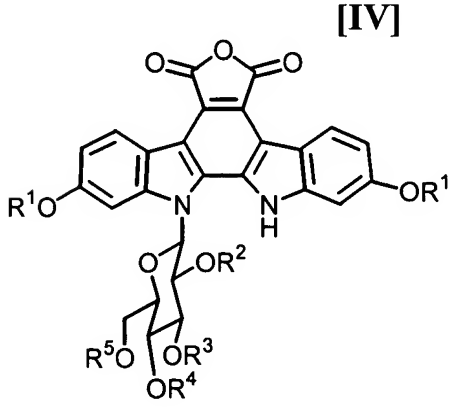
wherein each R^2, R^3, R^4 and R^5 is a hydroxy protecting group, and X^1 represents a halogen atom, to produce a compound of the formula (V):



[V]

wherein R^1, R^2, R^3, R^4, R^5 and Y have each the same meaning as defined above, or a salt thereof;

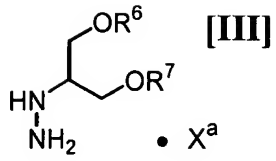
(v): the step of treating the resulting compound (V) or a salt thereof with a base to produce a compound of the formula (IV):



[IV]

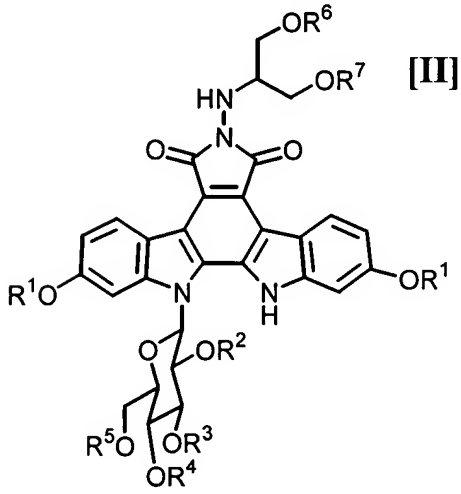
wherein R^1, R^2, R^3, R^4 and R^5 have each the same meaning as defined above, or a salt thereof;

(vi): the step of reacting compound (IV) or a salt thereof with a compound of the formula (III):



[III]

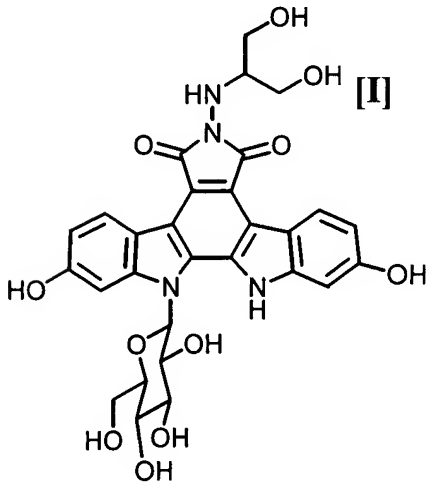
wherein R^6 and R^7 each represents a hydroxy protecting group, and X^a represents an acid molecule to produce a compound of the formula (II):



[II]

wherein R^1, R^2, R^3, R^4, R^5, R^6 and R^7 have each the same meaning as defined above, or a salt thereof; and

(vii): the step of deprotecting the resulting compound (II) or a salt thereof to produce an indolopyrrolocarbazole derivative of the formula (I):



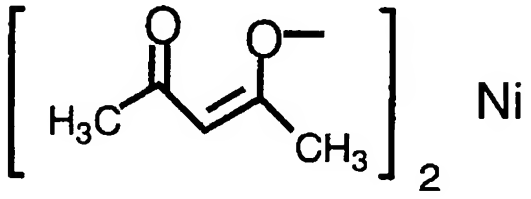
[I]

or a salt thereof.

2. (Original) The process according to Claim 1, wherein the rhodium compound is rhodium-carbon, rhodium-alumina, rhodium-calcium carbonate or rhodium-barium sulfate.

3. (Original) The process according to Claim 1, wherein the metal compound is a nickel(II) compound, an iron(II) compound, an iron(III) compound, a cobalt(II) compound or a cobalt(III) compound.

4. (Original) The process according to Claim 3, wherein the nickel(II) compound, the iron(II) compound, the iron(III) compound, the cobalt(II) compound or the cobalt(III) compound are $NiBr_2$, $Ni(NO_3)_2$, $Ni(OCOCH_3)_2$, $FeBr_3$, $FeCl_2$, $FeSO_4$, $FeCl_3$, $FeCl_3$-SiO_2, $Fe(OCOCH_3)_2$, Fe(II)fumarate, $CoBr_2$, $CoCl_2$,



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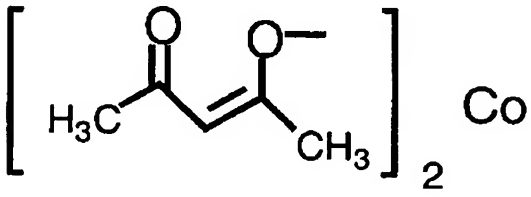

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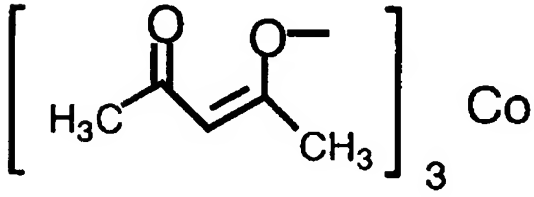
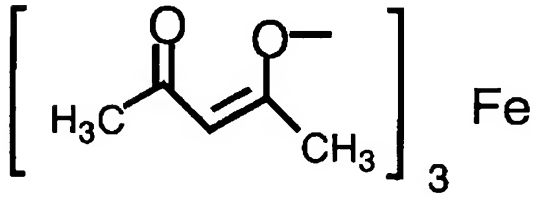


or

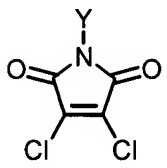


5. (Original) The process according to Claim 1, wherein R^1, R^2, R^3, R^4, R^5, R^6 and R^7 each represents a benzyl group.

6. (Original) The process according to Claim 1, wherein the magnesium chloride of the formula (XI) is ethyl magnesium chloride, isopropyl magnesium chloride or n-butyl magnesium chloride.

7. (Original) The process according to Claim 1, wherein the magnesium compound of the formula (X) is di(n-butyl)magnesium, di(s-butyl)magnesium, (n-butyl)(s-butyl)magnesium, dimethyl magnesium or diethyl magnesium.

8. (Original) The process according to Claim 1, wherein the maleimide compound of the formula (IX) is a maleimide compound represented by the formula (IX-a):



[IX-a]

wherein Y represents a hydrogen atom, a C_1-C_7 alkyl group, a phenyl group, a benzyloxymethyl group or an aralkyl group.

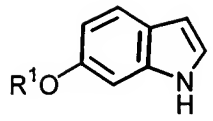
9. (Original) The process according to Claim 1, wherein Y is a methyl group.

10. (Original) The process according to Claim 1, wherein X^a is oxalic acid.

11. (Original) The process according to Claim 1, wherein the coupling is conducted in the presence of a phase transfer catalyst.

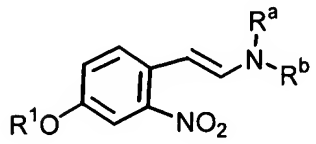
12. (Original) A process for producing an indole compound or a salt thereof, which comprises producing an indole compound represented by the formula (XII):

[XII]



wherein R^1 is a hydroxy protecting group, or a salt thereof by reacting a compound represented by the formula (XIII):

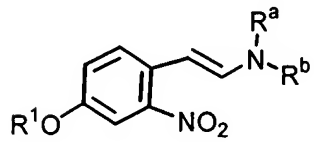
[XIII]



wherein R^1 has the same meaning as defined above, and R^a and R^b each independently represents a C_1-C_7 alkyl group, or R^a and R^b may be combined together to form a C_3-C_6 alkylenyl group, with hydrogen gas in the presence of a rhodium compound and a metal compound.

13. (Previously presented) The process according to Claim 12, which comprises reacting a compound represented by the formula (XIII):

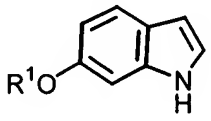
[XIII]



wherein R^1 is a hydroxy protecting group, and R^a and R^b each independently represents a C_1-C_7 alkyl group, or R^a and R^b may be combined together to form a C_3-C_6 alkylenyl group, or a salt thereof with hydrogen gas in the presence of a rhodium compound and a metal compound, and treating the resulting crude product with silica gel.

14. (Original) A process for producing a bis-indole compound or a salt thereof, which comprises reacting an indole compound of the formula (XII):

[XII]



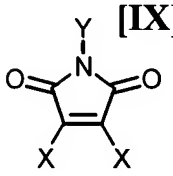
wherein R^1 represents a hydroxy protecting group, or a salt thereof with a magnesium chloride of the formula (XI):

R^cMgCl **[XI]**

wherein R^C represents a C_1-C_7 alkyl group, a phenyl group, a vinyl group or an allyl group; or a magnesium compound of the formula (X):

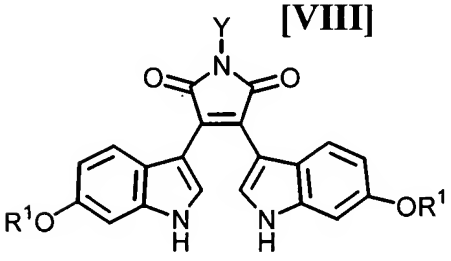
R^dMgR^d **[X]**

wherein R^d represents a C_1-C_7 alkyl group or a phenyl group, or a salt thereof, or a mixture of the magnesium chloride of the formula (XI) and the magnesium compound of the formula (X) in an inert solvent, followed by reacting the resulting product with a maleimide compound of the formula (IX):



[IX]

wherein X represents a halogen atom; and Y represents a hydrogen atom, a C_1-C_7 alkyl group, a phenyl group, a benzyloxymethyl group or a C_7-C_{12} aralkyl group, preferably in an inert solvent to produce a bis-indole compound of the formula (VIII):

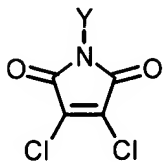


[VIII]

wherein R^1 and Y have each the same meaning as defined above, or a salt thereof.

15. (Original) Theprocess according to Claim 14, wherein the maleimide compound of the formula (IX) is a maleimide compound represented by the formula (IX-a):

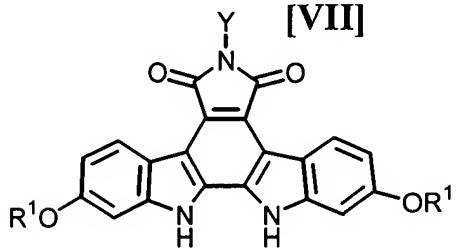
[IX-a]



wherein Y represents a hydrogen atom, a C_1-C_7 alkyl group, a phenyl group, a benzyloxymethyl group or a C_7-C_{12} aralkyl group.

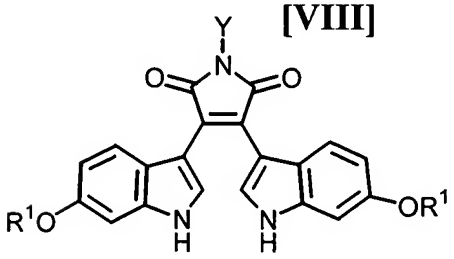
16. (Original) A process for producing a compound represented by the formula (VII):

[VII]



wherein R^1 represents a hydroxy protecting group, and Y represents a hydrogen atom, a C_1-C_7 alkyl group, a phenyl group, a benzyloxymethyl group or a C_7-C_{12} aralkyl group, or a salt thereof, which comprises treating a bis-indole compound represented by the formula (VIII):

[VIII]



wherein R^1 and Y have each the same meaning as defined above, or a salt thereof with 2,3-dichloro-5,6-dicyano-1,4-benzoquinone in a nonpolar solvent for ring-closure reaction.

17. (Original) The process according to Claim 16, wherein the nonpolar solvent is benzene, toluene, xylene (o, m or p), ethylbenzene or 1,2,4-trimethylbenzene.

18. (Original) A catalyst used for hydrogenation reaction, comprising a rhodium compound and a metal compound.

19. (Original) The catalyst according to Claim 18, which further comprises an amine.

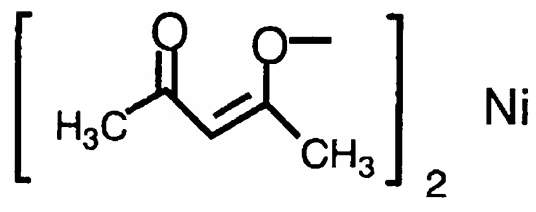
20. (Previously presented) The catalyst according to Claim 18, wherein the rhodium compound is rhodium-carbon, rhodium-alumina, rhodium-calcium carbonate or rhodium-barium sulfate.

21. (Previously presented) The catalyst according to Claim 18, wherein the metal compound is a nickel(II) compound, an iron(II) compound, an iron(III) compound, a cobalt(II) compound or a cobalt(III) compound.

22. (Original) The catalyst according to Claim 19, wherein the amine is a secondary amine or a tertiary amine.

23. (Original) The catalyst according to Claim 19, wherein the amine is pyrrolidine, piperidine, dimethylamine, diethylamine, diisopropylamine, dibutylamine, trimethylamine, triethylamine or tributylamine.

24. (Original) The catalyst according to Claim 21, wherein the nickel(II) compound, the iron(II) compound, the iron(III) compound, the cobalt(II) compound or the cobalt(III) compound are $NiBr_2$, $Ni(NO_3)_2$, $Ni(OCOCH_3)_2$, $FeBr_3$, $FeCl_2$, $FeSO_4$, $FeCl_3$, $FeCl_3$-SiO_2, $Fe(OCOCH_3)_2$, Fe(II)fumarate, $CoBr_2$, $CoCl_2$,



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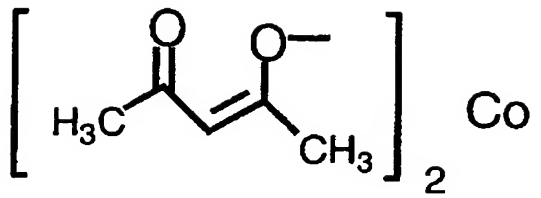

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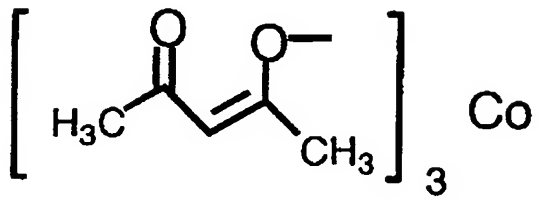

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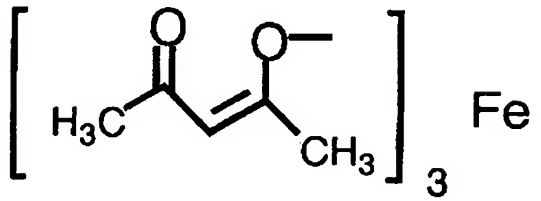


25. (Previously presented) The catalyst according to Claim 19, wherein the rhodium compound is rhodium-carbon, rhodium-alumina, rhodium-calcium carbonate or rhodium-barium sulfate.

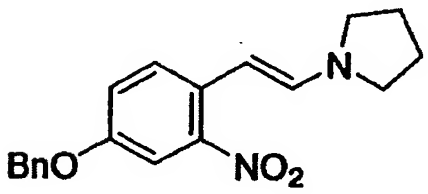
26. (Previously presented) The catalyst according to Claim 19, wherein the metal compound is a nickel(II) compound, an iron(II) compound, an iron(III) compound, a cobalt(II) compound or a cobalt(III) compound.

27. (New)

A process for producing an indolopyrrolocarbazole derivative represented by the formula (I), which comprises the following steps:

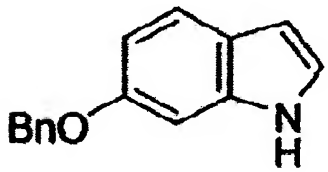
(i): the step of reacting a compound of the formula (1):

(1)



wherein Bn represents a benzyl group as a hydroxy protecting group, or a salt thereof with hydrogen gas in the presence of rhodium-carbon and iron(II) acetate to produce an indole compound of the formula (2):

(2)



wherein Bn has the same meaning as defined above, or a salt thereof;

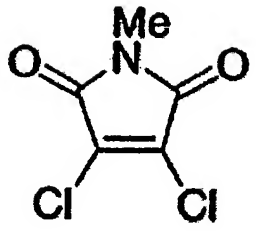
(ii): the step of reacting the resulting indole compound of the formula (XII-1) or a salt thereof with a magnesium chloride of the formula (XI-1):

(XI-1)

wherein Et represents an ethyl group; or a magnesium compound of the formula (X-1):

(X-1)

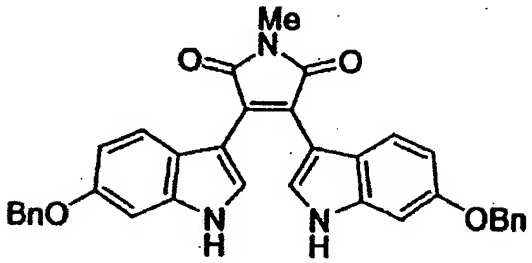
wherein Bu represents a n-butyl group, or a salt thereof, or a mixture of the magnesium chloride (XI-1) and the magnesium compound (X-1), followed by reacting the resulting product with a maleimide compound of the formula (IX-1):



(IX-1)

wherein Me represents a methyl group, to produce a bis-indole compound of the formula (3):

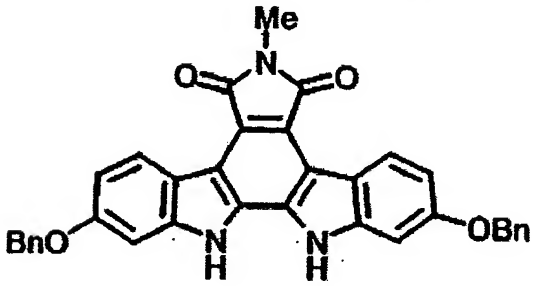
(3)



wherein Bn and Me have each the same meaning as defined above, or a salt thereof;

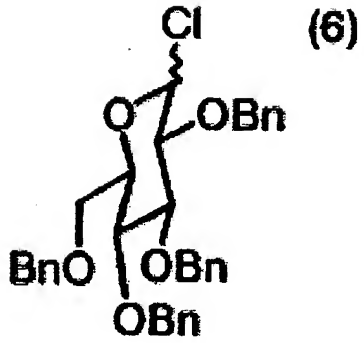
(iii): the step of subjecting the resulting bis-indole compound (3) or a salt thereof to ring-closure reaction to produce a compound of the formula (4):

(4)



wherein Bn and Me have each the same meaning as defined above, or a salt thereof;

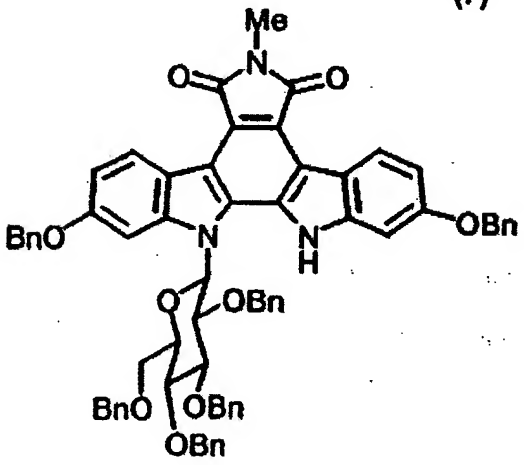
(iv): the step of coupling the resulting compound (4) or a salt thereof with an activated glucose derivative of the formula (6):



(6)

wherein Bn has the same meaning as defined above, to produce a compound of the formula (7):

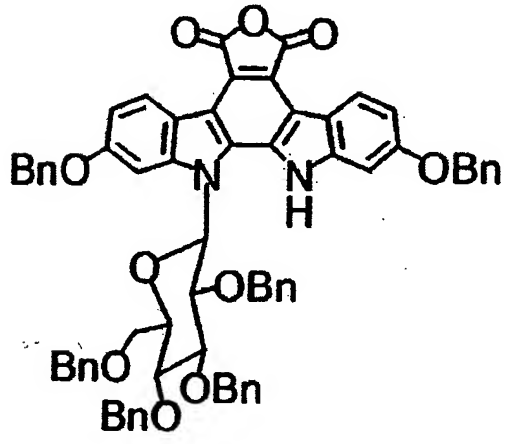
(7)



wherein Bn and Me have each the same meaning as defined above, or a salt thereof;

(v): the step of treating the resulting compound (7) or a salt thereof with a base to produce a compound of the formula (9):

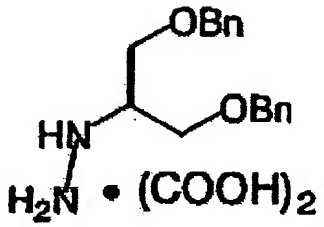
(9)



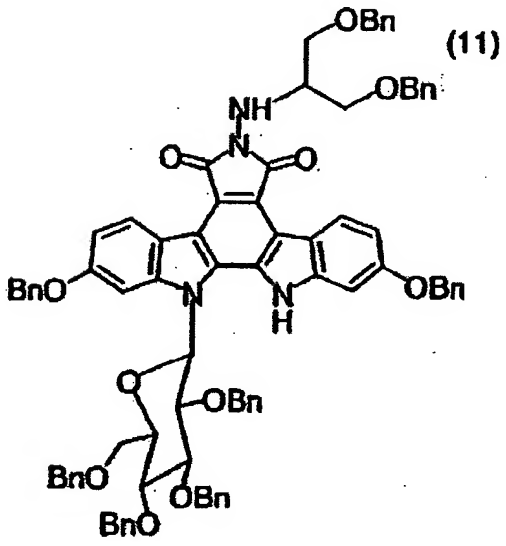
wherein Bn has the same meaning as defined above, or a salt thereof;

(vi): the step of reacting compound (9) or a salt thereof with a compound of the formula (12):

(12)

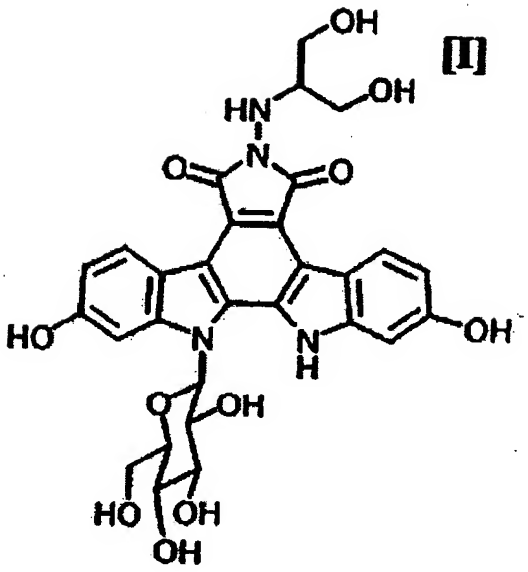


wherein Bn has the same meaning as defined above, to produce a compound of the formula (11):



wherein Bn has the same meaning as defined above, or a salt thereof; and

(vii): the step of deprotecting the resulting compound (11) or a salt thereof to produce an indolopyrrolocarbazole derivative of the formula (I):



[I]

or a salt thereof.